4 ENVIRONMENTAL MANAGEMENT SYSTEM

4.1 Description

Environmental protection is a priority at NREL, as indicated by NREL's environmental policy:

NREL is committed to sound environmental management that serves as an example to others and supports the Laboratory's mission to protect natural resources through research, development, and deployment of renewable energy and energy efficiency technologies. To this end, NREL is committed to:

- **Pollution Prevention.** Incorporating pollution prevention practices in research and support activities.

- **Continuous Improvement.** Continuously improving the effectiveness of NREL's environmental management system (EMS).

- **Campus.** Managing the impact on the environment caused by the placement and general design of NREL structures; maintaining, protecting, and restoring natural and landscaped environments to sustain natural and native ecological systems, both on and adjacent to NREL campuses.

- **Water.** Reducing water consumption and managing water discharges from all NREL sites.

- **Electricity/Natural Gas.** Reducing energy use in building designs and operations; within available funds, using cost effective renewable energy sources for remaining energy needs; and purchasing power generated by renewable energy sources.

- **Transportation.** Reducing the impact of local NREL travel on the environment; reducing the use of fossil-based gasoline/diesel fuel for NREL onsite and local operations through the use of alternative fuel vehicles or hybrids; and increasing the use of video and teleconferencing to reduce the environmental impacts of air travel.

- **Materials.** Reducing the use of materials and the creation of waste by reducing, reusing, and recycling materials needed for Laboratory operations; increasing the purchase and use of environmentally sensitive products and products with recycled content.

- **Environmental Management.** Providing an environment that promotes efficiency, effectiveness, and sustainability, and encourages the creativity and personal motivation required for excellence in scientific, engineering, technology development, and support functions.

- **Education/Communication.** Informing and providing outreach to workers about sustainability activities, including a method for interaction and feedback; educating

workers about participating and contributing to sustainable activities. Informing workers and the public about NREL's environmental performance, including a method for interaction and feedback.

- **Compliance with Requirements.** Complying with applicable federal, state, and other environmental requirements and exceeding those requirements, when feasible, by implementing environmental best management practices.

The Environmental Management System (EMS) is in place to implement NREL's environmental policy, and is comprised of a framework of policies and procedures that are integrated with NREL's normal management processes, combined with the environmentally sound daily work practices of Environment, Safety & Health (ES&H) Office staff and personnel throughout the Laboratory. Environmental protection must involve everyone at the Lab in order for it to be effective. All activities conducted at NREL must comply with federal and state laws and regulations, and DOE requirements.

As a DOE-owned facility, NREL is required to implement its EMS as part of an Integrated Safety Management (ISM) System, according to DOE direction. The Environmental Management Policy (6-2) and 19 supporting laboratory-level environmental programs that define the NREL EMS have been coordinated and linked with the ISM Policy (2-1), the ES&H Policy (6-1), the supporting ES&H Policies (6-3 through 6-6), and approximately 40 supporting Lab-level safety and health programs. The EMS is further integrated with ISM via task specific procedures that flow down from the policies and programs, such as Safe Operating Procedures (SOP).

Notable 2004-5 Activities

In early 2004, NREL was accepted into the EPA National Environmental Performance Track (NEPT) Program and the Colorado Environmental Leadership Program (CELP). The NEPT program is a national voluntary partnership between EPA and participating private and public U.S. facilities that recognizes environmental leadership and performance; the CELP program is a similar state-level voluntary partnership. As a component of these programs, each year NREL sets voluntary performance goals in an effort to further enhance environmental performance at the Laboratory. NREL was one of the first two DOE national laboratories to be accepted into NEPT.

An NREL Self-Assessment and DOE-GO Surveillance of NREL's EMS were conducted in 2004. More detail is provided in Section 4.3 of this report.

In August 2005, representatives from EPA Region 8 and the Colorado Department of Public Health and Environment (CDPHE) visited NREL to review the Laboratory's commitment to the NEPT and CELP programs. During the site visit, EPA and CDPHE were impressed with NREL's commitment to going beyond compliance in the areas of environmental performance and sustainability. EPA found NREL's sustainability practices to demonstrate leadership, its public outreach program to be very strong, and its environmental management system to be sound and well documented.

4.2 Performance Indicators and Progress

2004 Environmental Objectives and Progress Toward Goals

Each fiscal year, NREL in collaboration with the DOE Golden Field Office (DOE-GO) develop environmental objectives for the upcoming year as part of NREL's One-Year Plan. For fiscal year 2004, the objectives were:

- Continue coordination of Sustainable NREL with NREL's EMS
- Develop scope statements and budget requirements for migratory bird, wildlife, and cultural resource surveys in support of planned development of the STM Site.
- Continue the pursuit of EMS leadership recognition through the EPA NEPT, as initiated in FY03.
- In conjunction with the EPA NEPT, simultaneously pursue EMS leadership recognition through the CDPHE Environmental Leadership Program.
- Implement improvements identified through assessments and reviews.

As mentioned in the preceding section, in early FY2004, NREL was accepted into EPA's NEPT Program and the State of Colorado CELP Program. This has furthered the collaboration between Sustainable NREL and the ES&H Office EMS activities. The performance commitments made through NEPT and CELP programs are being implemented at NREL via the Sustainable NREL program. The commitments made are to reduce overall energy usage, reduce water use, reduce greenhouse gas emissions, and reduce carbon monoxide air emissions.

NREL participated in two DOE Golden Field Office Surveillances in 2004: NREL's Hazardous Waste Specific Waste Streams and Storm Water Compliance for the Science and Technology Facility (S&TF) Construction. Additional information can be found in Section 4.3 below.

Sustainable NREL and EMS staff worked together to compile pollution prevention data on waste generation, recycling, and green purchasing. NREL received a DOE P2 Star award for Petroleum Fuel Reduction Through Alternative Fuels. This is the result of efforts by Sustainable NREL to improve the sustainability of NREL's vehicle fleet.

A wildlife survey (including migratory birds) of the STM Site was begun in the spring of 2004; it was completed in Spring 2005. Further details are provided in Section 5.11.

A detailed cultural resources survey of the historic features on the southernmost parcel of NREL's STM Site was conducted during the spring and summer of 2005. It will be discussed further in the 2005 report.

National Environmental Performance Track Commitments

NREL's performance commitments under the NEPT program are three-year commitments, to be in place throughout NREL's three-year participation in the program, from 2004 through the end of 2006. NREL's commitments are as follows.

Commitment #1: Reduce emissions of greenhouse gases by 10% from the 2002 baseline year.

NREL is on track to meet this commitment. In 2003, NREL installed on-line site metering data for employees and building area engineers. In 2004, this metering data was monitored so that energy and peak load management strategies can be evaluated at individual buildings on campus.

A number of projects involving energy management were initiated in 2004. They were implemented to reduce NREL's total energy use and resulting CO_2 emissions. These projects include two HVAC equipment replacement projects, one at NREL's FTLB laboratory building and the other at the main building, Building 251, at NREL's NWTC. Other projects include an upgrade of NREL's direct digital building power controls; installation of a natural gas boiler at the NWTC Building 251; a supply fan upgrade at the AFUF laboratory building; an Energy Center Expansion project at the SERF laboratory building (central plant expansion with new high efficiency chiller and room for future high efficiency condensing boiler); and two programmable thermostat upgrades at the NWTC Data Shed and Shipping and Receiving facilities.

Commitment #2: Reduce water use by 5% from the 2002 baseline year.

NREL has already met this 5% water use reduction goal. Therefore, the Laboratory has extended its commitment to reduce water use even further. In 2005, NREL committed to a reduction in total water use of 20% from the 2002 baseline. The 2004 annual consumption was lower than would normally be expected, because one of the four evaporative cooling units at the SERF building was down for significant periods of time for repair and maintenance. In addition, some of the water usage data is comprised of estimated figures, due to a water supply company meter error.

In 2004, NREL implemented two best management practices to reduce water consumption. These include: 1) cooing tower management, that involved changing the chemical to water ratio; and 2) conducting distribution system audits, leak detection, and repair.

Commitment #3: Reduce emissions of carbon monoxide.

This goal was to be accomplished by obtaining a greater percentage of NREL's fleet vehicles as alternative fuel vehicles from the U.S. government's General Services Administration, the supplier of NREL's fleet vehicles. In 2004, NREL requested three additional ethanol-85 fleet vehicles from GSA. The vehicles were not available, and our emissions were unchanged from the 2002 baseline.

Commitment #4: Reduce total energy use by 3% from the 2002 baseline year.

NREL has already met the original 2006 performance goal of 3% energy use reduction. Therefore, the Laboratory is extending our commitment to a reduction in energy use of 7% from the 2002 baseline.

A number of projects involving energy management were initiated in 2004. These projects are described above in the greenhouse gas commitment (#1).

2005 Objectives
Environmental objectives developed by NREL in collaboration with DOE-GO for fiscal year 2005 are:

- Participate in the GO surveillance program.
- Complete self-assessments of selected environment, Safety and health programs
- Support GO STM and NWTC Site-wide EA analyses consistent with proposed site development plans.
- Demonstrate progress toward achieving NEPT goals.
- Initiate identification and analysis of operational impacts presented to the NWTC by the impending Rocky Flats closure.

Progress toward the 2005 goals will be reported in the NREL 2005 Environmental Performance Report.

4.3 Assessment and Improvement

Periodic assessment and management review of NREL's EMS and its components provide verification that the EMS continues to be an effective tool to: achieve and maintain compliance with regulatory and legal requirements, meet the established environmental goals of the Laboratory, and maintain management support for NREL's environmental goals. Assessment and management review also provide for continuous improvement of the EMS.

There are three different types of assessments performed to evaluate the functionality of the EMS at NREL: EMS assessments, periodic compliance assessments, and third-party assessments.

A team of NREL staff generally performs assessments of NREL's EMS internally on a periodic basis, The team generally includes NREL Environment, Safety & Health staff and staff involved in the Sustainable NREL initiative. The scope of the assessments includes both the management of significant environmental aspects and policy implementation. The team evaluates the EMS based on an appropriate set of criteria, such as ISO 14000 standards, EPA National Environmental Performance Track standards, or other applicable environmental management standard. The assessment team selects the most appropriate set of criteria for each assessment.

Periodic compliance assessments are conducted of individual environmental programs to verify that the program, as written, meets all applicable legislative and regulatory

requirements and that the program is implemented as intended. Improvements are developed and implemented as necessary, based on the results of each assessment. NREL has established an ES&H self-assessment program to conduct these compliance assessments. These are normally conducted in coordination with the DOE Golden Field Office (DOE-GO) ES&H Surveillance Program. A specific set of Lab-level environment, safety, and health programs are selected for assessment each year based on criteria established by the GO/NREL Operations Team, with the selected set including environmental programs that are part of the EMS.

In addition to regular compliance assessments of individual NREL environmental programs, NREL has management system review processes in place for regular reviews and updates of the set of policies, Lab-level programs, and task specific procedures, including EMS policies and programs. NREL reviews its ES&H policies as needed, but at least every 4 years, and makes revisions as necessary. All SOPs are reviewed on an annual basis and are revised as necessary to help ensure the required controls are appropriate for the hazards present. Environmental hazards and controls are specifically called out in each SOP.

Periodically, external third-party assessments may be conducted by technical experts for specific components of NREL's environmental programs or for the EMS as a whole. These assessments are conducted on an as-needed basis. EPA has established a new requirement, as part of its NEPT Program, for external EMS audits of participating facilities every 3 years. As NREL is a member of NEPT, the Laboratory will begin conducting external audits on the 3-year frequency.

2004 Assessment Activities

A self-assessment of NREL's EMS was begun in mid-2004. A surveillance by the DOE Golden Field Office was conducted concurrently. The self-assessment was performed by a team of NREL ES&H staff and staff involved in the Sustainable NREL initiative. DOE-GO staff also participated in the assessment team data collection activities, including interviews. The scope of the assessment included both the management of significant environmental aspects and policy implementation. The assessment team evaluated the EMS using international Global Environmental Management Initiative (GEMI) criteria, which are based on the ISO 14001 standard, and NEPT standard criteria. The Surveillance and Self-Assessment activities were completed in late 2004.

The objectives of the Self-Assessment were to:

- evaluate environmental performance
- verify compliance with legal and other requirements
- meet the established environmental goals of the Laboratory
- provide for continuous improvement of the EMS
- provide information on the results of the assessment to management

NREL determined that it meets all legal requirements and is well positioned to meet its other applicable requirements, such as DOE and Executive Orders, within the timelines

set out by those orders. The assessment team also identified a number of areas for continuous improvement, including seven priorities for improvement. These priorities include:

1. Update the Integrated Safety Management System (ISMS) description to more fully incorporate the EMS.
2. Improve coordination of environmental goals and objectives across various laboratory sectors.
3. Develop additional quantitative performance measures in areas of significant environmental impact.
4. Implement an EMS database tool that would capture all the EMS elements into a single integrated system.
5. Develop new procedures or modify existing procedures to better address early identification of environmental concerns.
6. Consolidate NREL's environmental policy into a single document.
7. Develop an integrated report of sustainability information and environmental information.

It is anticipated that implementation of the potential continuous improvements identified during the assessment will be a multi-year effort. An action plan to implement the potential improvements identified in the EMS Self-Assessment and Surveillance has been developed. Progress in implementing improvements will be reported in the 2005 ASER.

Also in late 2004, DOE-GO conducted two additional activity-focused surveillances: Hazardous Waste Specific Waste Streams and Storm Water Compliance for the S&TF construction. There were no DOE findings as a result of either surveillance, and no corrective actions were required. The DOE Golden Field Office report for the Storm Water surveillance stated that NREL maintains exceptionally thorough records that facilitate NREL's compliance with current regulations.

4.4 Sustainability and the Environmental Management System

NREL's mission has always focused on a sustainable energy future for our nation and the world. Sustainability is defined as the simultaneous and balanced pursuit of economic viability, environmental stewardship and public responsibility.

The Sustainable NREL Program was created to realize the vision of greater sustainability in NREL operations. It is an interdisciplinary initiative comprised of staff from numerous NREL centers and offices with the goals of maximizing efficient use of resources; minimizing waste and pollution; and serving as a positive force in economic, environmental, and public responsibility. Elements of the environmental stewardship component of Sustainable NREL include:

- Campus and Transportation
- Water, Electricity, and Natural Gas
- Reduce, Reuse, Recycle, Rebuy
- Education and Communications
- Environmental Management

Sustainable NREL carries out NREL's commitments to, among other things, reducing energy use in its building operations; designing energy efficient and environmentally sensitive new buildings; reducing water consumption; decreasing greenhouse gas emissions; minimizing the impact of local NREL travel on the environment; using less fossil-based fuel for local operations; incorporating renewable energy technologies into its on-site STM and NWTC operations; and creating less waste by reducing, reusing and recycling materials for Laboratory operations.

The environmental management system supports Sustainable NREL's goals, with the EMS focusing on protecting the natural and cultural resources on and around NREL sites by reviewing NREL's potential for environmental impacts through emissions, discharges, waste generation, and land use; conducting required permitting activities; and recommending and coordinating measures to minimize any potential impacts NREL's activities have on the environment. There is synergism between Sustainable NREL and environmental protection activities of the ES&H Office in that both address different components of NREL's environmental footprint. Together, Sustainable NREL and the EMS, as implemented by the ES&H Office, form a single environmental program that is integrated with NREL's other management processes.

More detail is provided elsewhere in this report about the following sustainability-related efforts at NREL:

- Sustainable landscaping is described in Section 3.10, Vegetation Management.
- Pollution Prevention activities are discussed in Section 3.9, Pollution Prevention.